

REMARKS/ARGUMENT

By this amendments claims 1-10 remain pending in this application. Claims 1-10 have been amended. Claim 11 is newly added. No new matter is added. Applicants reserve the right to pursue the original claims in this application and in other applications. Applicants respectfully request reconsideration in view of the above amendments and the following remarks.

In numbered paragraph 1 of the Office Action, claim 1 is objected to as containing certain informalities. Applicants have amended claim 1 to cure the noted deficiencies. Accordingly, Applicants submit that the objection is overcome and respectfully request the Examiner for withdrawal of the same.

In numbered paragraph 3 of the Office Action, claims 1-10 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants have amended claim 1 to cure the noted deficiency. Accordingly, Applicants submit that the rejection is overcome and respectfully request the Examiner for withdrawal of the same.

In numbered paragraph 5 of the Office Action, claims 1-3, 5, 6 and 8-10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Agarwala et al. (U.S. Patent No. 5,258,072). In numbered paragraph 8 of the Office Action, claims 4 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Agarwala et al. in view of Barrow (U.S. Patent No. 5,796,589). Applicants respectfully traverse these rejections.

A feature of the mounting structure of the present invention as recited in claim 1 which is neither taught or suggested by the cited prior art includes, in part,:

“a via formed through said printed circuit board, said via providing electrical communication between said pad and said connection”

The invention of claim 1 accordingly provides a mounting structure, for example, a

semiconductor package, the mounting structure having a via formed all the way through a printed circuit board for electrically connecting a pad to a connection wiring.

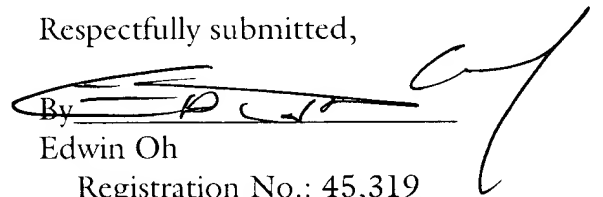
In contrast to the present invention as recited in claim 1, the disclosure of Agarwala is concerned with a method of forming a solder bump on a semiconductor chip. As shown in Fig. 1E, pads 18, 13, 14 are formed in an opening of a passivating layer 15 to contact the conductor 16. As discussed above, the opening that is formed in the structure of Agarwala is in a passivating layer 15 and not formed through a printed circuit board as recited in claim 1 of the present invention. Accordingly, the disclosure of Agarwala does not teach or suggest the mounting structure of the present invention. Hence, Applicants submit that the rejections are overcome and respectfully request the Examiner for withdrawal of the same.

Claims 2-10 depend from claim 1 and should be allowable for at least the reasons as provided above for claim 1 and for its own unique combination of features which are neither taught or suggested in the cited prior art. Claim 11 recites similar limitations as in claim 1 and should be allowable for at least the reasons as provided above. Barrow ('589) is cited for a different feature and does not cure the deficiencies of Agarwala.

In view of the foregoing, Applicants believe that each of the presently pending claims in this application are in immediate condition for allowance. Accordingly, Applicants respectfully request the Examiner to allow the claims and the pass this application to issue.

Dated: December 10, 2002

Respectfully submitted,

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APPENDIX A

**Version of Each Paragraph/Section/Claim with markings showing changes made
37 CFR 1.121(b)(1)(ii) AND (c)(1)(i)**

IN THE TITLE:

MOUNTING STRUCTURE [OF] FOR SEMICONDUCTOR PACKAGE

SPECIFICATION:

Paragraph at page 1, line 5 to page 1, line 9:

The present invention relates to a mounting structure [of a semiconductor package] for [electrical connection with a connection wiring by soldering the semiconductor package on a pad on] a printed circuit board.

Paragraph at page 1, line 22 to page 2, line 7:

[On the other hand] However, in order to enhance wettability of the semiconductor package with the solder 5, a plating 6 is provided over the pad 2 and the head portion 3a of the connection wiring 3. Also, for mutual insulation between adjacent pad 2 and the connection wiring 3, a solder resist 7 is applied on the surface layer of the printed circuit board 1. As shown in Figs. 4 and 5, the solder resist 7 contacts with the plating 6 at the outer circumference of the pad 2 and the connection wiring 3 is covered by the solder resist 7. The reference numeral 10 denotes a runout for the solder resist provided between the pad 2 and the solder resist 7.

Paragraph at page 3, line 1 to page 3, line 4:

[By development of the] Due to this stress F, breakage of copper wire 3 is caused at the boundary portion of the nickel plating 6 and the solder resist 7. By breakage of the copper wiring 3, the semiconductor device can be broken.

CLAIMS (with indication of amended or new):

Claim 1. (Amended) A mounting structure [of a semiconductor package] of a printed circuit board for establishing electrical connection [of a pad on a printing circuit board] to a [connection wiring by soldering the] semiconductor package, said mounting structure comprising:

[said] a pad [being integrally] formed on a first surface of said printed circuit board [with a via];

[said soldering being performed by penetrating a part of solder within said via so that said] a connection wiring formed on a second surface opposite to said first surface; and

a via formed through said printed circuit board, said via providing electrical communication between said pad and said connection wiring.

[is connected to said pad through said via at a layer different from a layer of said pad.]

Claim 2. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 1, wherein said via [is depressed from said pad of] has an annular shape on said printed circuit board [to project] for establishing said electrical communication [connection with the connection wiring at the tip end thereof].

Claim 3. (Twice Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 1, wherein a plating is provided on the surface of said pad and an inner surface of said via.



Application No.: 09/872,256

Docket No.: H2041.0061/P061

Claim 4. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 1, wherein said via is formed in said pad of said printed circuit board corresponding to a corner of said semiconductor package.

Claim 5. (Twice Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 1, wherein said via [is projected from said pad in] has a truncated cone shape [to extend into a through hole of said printed circuit board and is integrally connected with said connection wiring] for providing said electrical communication.

Claim 6. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 3, wherein said via [is projected from said pad in] has a truncated cone shape [to extend into a through hole of said printed circuit board and is integrally connected with said connection wiring] for providing said electrical communication.

Claim 7. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 2, wherein a [vacant] space is [certainly] provided between an outer circumference of said pad and a solder resist on said printed circuit board.

Claim 8. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 2, wherein a plating is provided on the surface of said pad and an inner surface of said via.



Application No.: 09/872,256

Docket No.: H2041.0061/P061

Claim 9. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 2, wherein said via [is projected from said pad in] has a truncated cone shape [to extend into a through hole of said printed circuit board and is integrally connected with said connection wiring] for providing said electrical communication.

Claim 10. (Amended) A mounting structure [of a semiconductor package] as [set forth] in claim 8, wherein said via [is projected from said pad in] has a truncated cone shape [to extend into a through hole of said printed circuit board and is integrally connected with said connection wiring] for providing said electrical communication.